

CHAPTER – III

RESEARCH PROCEDURE

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3.1 Introduction-

Research in education as in the other fields is essential for providing useful and dependable knowledge through which the process of education can be made more effective. Education has strong roots in the fields like philosophy, history, economics, psychology and sociology. It is an intensive process of scientific enquiry about the philosophical, historical, economic, psychological and sociological impact on various aspects of education that sound theories can be established. Since education depends on a corpus of knowledge, there is need to add scientific knowledge to it for enrichment and improvement. #1

The above view, points out that the problem chosen by the researcher has roots in existing literature. Further research and exploration is needed in the field of Educational Technology.

This chapter deals with the procedure followed and the method developed and used. This chapter describes the sample selection, statistical techniques used, their results and conclusions.

3.2 Survey Method:

The Method of research is determined by the nature of problem, the problem is related with human behaviour, so the

researcher follows the method Behavioural Survey Method for collecting the data. The accuracy of result and consistency of conclusions would depend up on the procedure followed for collecting the data. The problem related with human behaviour comes under the descriptive survey Method. Descriptive survey studies are designed to obtain precise information, concerning the current status of phenomena, and whenever possible to draw valid general conclusions from the facts discovered. #2 The descriptive survey method has been the most popular and most widely used research method in education. Descriptive survey method helps to explain educational phenomena in terms of the conditions or relationships that exist opinions that are held by students, teachers, parents, experts, processes that are going on effects that are evident or trends that are developing. Due to the apparent ease and directness of this method, the researcher was to gather information in terms of individual opinion about some issues by a simple questionnaire. At times descriptive survey is the only means through which opinions, attitudes, suggestions for improvement of Educational practices, instructions and other data obtained. #3

In the present attitude survey, the questions are asked to express an opinion or belief. The questions related to voting behaviour, because of attitude is related to behaviour. Single question concerning persons opinions or beliefs provide rather unreliable measure of the persons attitude. In order to considering this basic deficiency researcher was asked several question each one of which probe the persons attitude but from different angle. Present survey concerning attitude concerned not only with whether the persons attitude is positive or negative but also to extent to which how for it is negative or

positive. The objective of studies is to develop a scale to measure the attitude towards Educational Technology. The present survey method of attitude involve problems related to the design of questions and involve the scaling to those questions along an attitude dimension #4

The present study is related to construction of a scale to measure the attitude. Behavioural survey method is appropriate because attitude is a characteristic of human behaviour. Hence the researcher selected the above said method.

3.3 Programme of the work:

For construction of a scale, the researcher made a detailed programme of activity, which was related to nature of work. For making detailed programme of activity researcher had taken following points in to consideration.

- a) Limitation under which the scale has developed. The main limitation is that the scale is specially constructed, for the subject Educational Technology for student teachers at B. Ed. level.
- b) For standardization and norm calculation the same heterogeneous sample was used.

3.4 Actual Programme:

Firstly the prescribed syllabus of Educational Technology recommended by Shivaji University for B. Ed. Course was studied. Which is given in appendix-A. The researcher found out the major core area on which the scale was prepared. The researcher found out the three major areas, which were important of Educational Technology.

1. Importance of subject
2. Content of subject- method, Techniques, approaches.
3. Effect of teaching on learning process

The researcher determined the method for constructing the scale by studying the various reference books on Methodology of Educational Research, Psychological Testing, Measurement in Education, in Psychology, Measurement and evaluation in Psychology, Measurement and evaluation etc.

By considering the all aspects of major focusing area of Educational Technology. The researcher started constructing items for scale. The first draft of the scale was prepared considering the objective of the problem stated in the chapter-I.

3.5 Preparation of First draft:

Item construction-

When the objective of the test was finalized and related source material analysed, construction of items was started. During construction of items, general principles were kept in mind. Every precaution was taken to ensure that items are valid, appropriate and unambiguous. The following major things were taken in to account while constructing the items.

- a] More than one type of items were included in the preliminary draft in order to make the draft interesting as well as representative.
- b] The numbers of items in the preliminary draft were more than the final draft.
- c] The items were clearly phrased so that their content and not their form, determines the response word like always, exclusively never positively and the like were avoided.

- d) Items belonging to one type were not in a one place.
 - e) There was not only sequence in responses.
 - f) Responses were in a chance order so that one response may not lead to another.
- There was more emphasis on learning rather than on memory or recall.
- h) The test was more comprehensive enough.
 - i) No item was such that it could be replied by referring to any other item or a group of items.
 - j) Every item in the test carried equal marks.
 - k) No item in the scale was suggestive. It did not give any clue about the answer of the other.
 - l) No item in the scale was universal truth.
 - m) No items in the scale was general statement
 - n) The wording of the items were such that the whole contents determine the answer and not a part of it #5

During construction a scale above all factors were taken in to consideration and scale was prepared. The scale contained 120 items.

The prepared first draft of the scale was given to six experts, senior persons in this related field. The list of experts is enclosed in appendix-C. Out of six, two experts from department of Education, Shivaji University Kolhapur. One from out station college, Smt. Putalaben Shah College of Education Sangli. And three from local college, Azad college of Education Satara. First draft with covering page including remarks of evaluation and separate page for suggestions and opinion of experts was given for analysis evaluation which is enclosed in appendix-B.

Thus items which were valid and recommended by experts were taken in to account. According to evaluation remarks and suggestions of experts, the modification of items were done, few items were change the word, language and 120 items were finally prepared for draft, for tryout.

3.6 Tryout:

Tryout of the items is a very necessary and important step in preparation of final draft for the scale because it has following advantages.

3.6.1 Necessity of Tryout-

It helps in deleting irrelevant item and selecting relevant ones in the final form of test. The best items are always selected by estimating the difficulty level and discriminating power of each and every item.

The tryout form of any test can only give such type of useful data. Sometimes best-predicted item fail in the practice. But by the analysis of responses the best constructor selects the best items for final form.

The importance of tryout in following manner. The tryout of the scale is useful.

1. To identify weak or defective items, which need improvement.
2. To determine difficulty level of each question.
3. The data from tryout test helps in choosing the best discriminating items.
4. To determine the exact sufficient time for finishing the test.

5. To find out exact number of items which should be included in the test.
6. To avoid the overlapping items giving proper hints.

3.6.2 Administration of Tryout-

The first draft (initial draft) was xeroxed and given to randomly selected 30 students from B. Ed. course students of Azad College of Education, Satara for the year 2001-2002. Every test has a separate page attached for suggestions, from students. First of all the researcher explained the purpose of test, also some instructions regarding the test were given, first page was self-explimentary about required instructions. Then the researcher stated that the time required to solve the test was unlimited, but after the completions of test submitted promptly. The researcher noted the individual time for the completion of test and mean average time required was calculated. The average time was 45 minutes

Lokesh Kaul stated that, tests for collecting data in research situations, a researcher must evaluate their validity, reliability and usability. These evaluation criteria are considered desirable for good test. By considered all above criteria the researcher found out validity of test from the collected data through 30 student's selected. #6

The validity index of an item i.e. its discriminative power was determined by the extent to which the given item discriminates among examinees who differ sharply in the function (or functions) measured by the test as a whole. The researcher used biserial correlation procedure for item

analysis. Biserial 'r' gives the correlation of an item with total score on the test or with scores in some independent criteria.

The following procedure was followed to calculate the validity index.

1. Arrange the test papers in order of size for test score. Put the paper with the highest score on top.
2. The researcher examined 30 test papers out of 30 nos. top 27% of papers and bottom 27% of papers was kept separately i.e. Sixteen papers kept separately and middle 46% papers i.e. fourteen was kept aside.
3. Tally the number in the top group, which passes each item on the test and the number. In the bottom group which passes each item.
4. Convert these numbers in to percentage.
5. Correct these percent for chance successes.
6. Entering in Flanagan's table which is given in appendix- D with the percentage of successes in two groups. Read the biserial 'r' from the intersecting column and row in the body of the table. That value is the validity index of the item.#7

3.7. Sample Selection-

In most research instances in the educational phenomena, it is not possible to collect data from every respondent relevant to our study, but only from some fractional part of all the respondents. The process of selecting the fractional part is called "sampling". While the basic motivation for sampling is the simple impossibility of studying every respondent #8 some populations are so large that their study would be expensive in terms of time, money, effort and manpower. Sampling is the process by which a relatively small

number of individuals or measures of individuals, objects or events is selected and analysed in order find out something about the entire population from which it was selected. It helps to reduce expenditure, save time, and energy. Permit measurement of greater scope or produce greater precision and accuracy. Sampling procedure provide generalizations on the basis of a relatively small proportion of the population. The representative proportion of the population is called as sample. To obtain a representative sample, the researcher selects each unit in specified way under controlled conditions. Sample is small proportion of population selected for observation and analysis. A good sample must be nearly representative to the entire population, as possible and it must provide identically the whole of the information about the population from which has been drawn. #9

3.7.1 Stages of sampling-

David J fox has given five stages or elements in the sampling process. 1. The universe, 2. population, 3. the invited sample, 4. The accepting sample, and 5. the data producing sample.

1. Universe- Mean all possible respondents or measures of a certain kind. In our study the universe is all colleges of Education with same academic conditions.

2. Population- The portion of universe to which the researcher has access is called population. In our study Azad College of Education, Satara. College of Education, Karad, B. Ed. College, Patan. College of Education Phaltan, the academic year 2001-2002. Distance education Yashwantrao Chavan Maharashtra

Open University, Nasik. (Study centre- Azad College of Education, Satara academic year 2000-2002)

3. Invited Sample -All elements of the population to which an invitation to participate in the research is extended.

4. Accepting Sample- That portion of the invited sample that accepts the invitations and agrees to participate.

5. Data producing sample- Is that portion of the accepting sample that actually produces data.

The Sampling cycle-

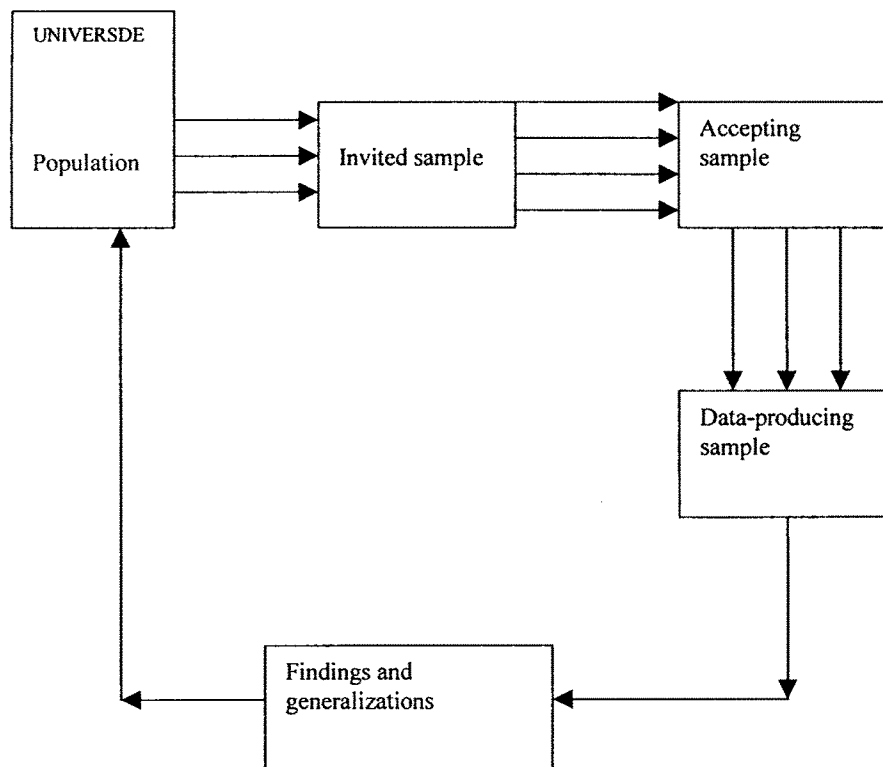


FIG. III-1. Sampling Cycle.

(Source: David J. Fox, (1969) The Research Process in Education.(P.321)

3.8 Administration of draft on sample-

The draft of the scale was printed and given to the invited population that was student teachers of Azad College of education, Satara. At the time of test 154 students was present for the test. At the end of the draft space was provided for suggestions. The test with 120 items. The time was given for this test was 45 mints. The purpose of test was explained to students. Any type of suggestions, queries were most welcome. Then actual time observed that the 90% student completed the test within prescribed time and 10% students required 7-8 mints extra for completing the test. Then collecting the test and calculate score of individual student and recorded on separate page given in appendix- E. The same procedure was followed for administrating the draft for other colleges.

3.8.1 Evaluation of Draft.

The draft of the test contained 50 % positive items and 50 % negative items. i.e. out of 120 items 60 items were showing positive attitude and 60 items showing negative attitude, each item in the test was evaluated as per below giving rating.

For positive attitude item

5	4	3	2	1
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for negative attitude item

1	2	3	4	5
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The researcher found out the total score of individual students and recorded. The researcher studied the suggestions queries and remark from student teachers and concluded that out of 120 items 20 items were not suitable for test or found difficulties in understanding the meaning of items. Then

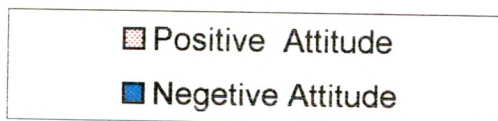
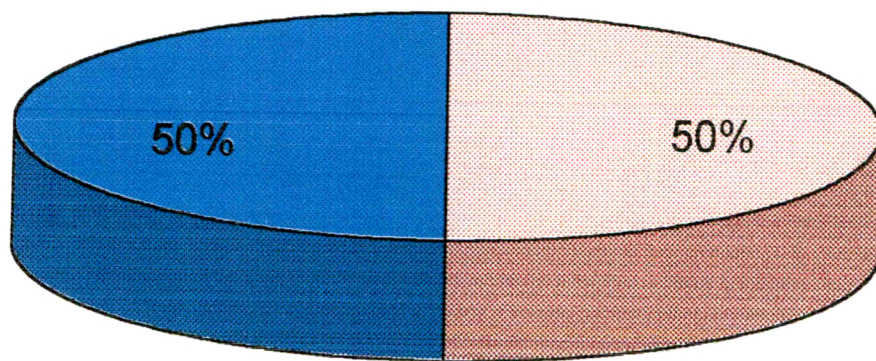
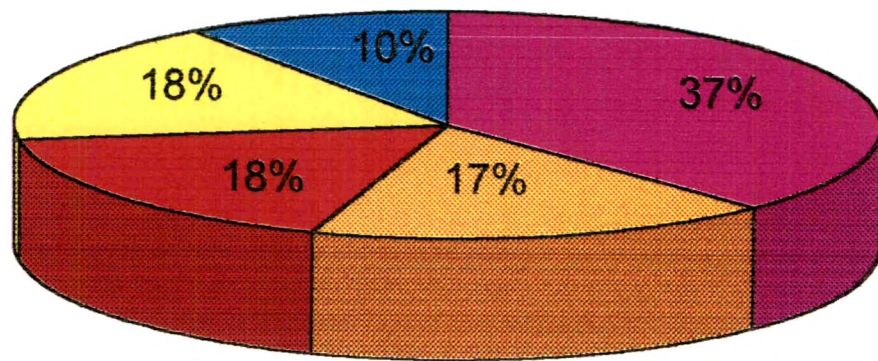


FIG. III-1. Distribution of the Items in the scale.



- Azad College of Education, Satara.
- College of Education, Karad.
- College of Education, Patan.
- College of Education, Phaltan.
- Y. C. Open University, Nashik.

FIG. III-3. Distribution of student teachers (Collegewise) in the sample.

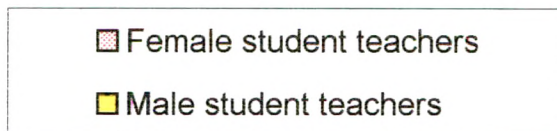
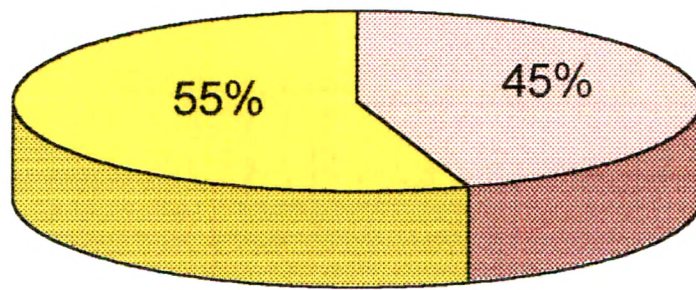
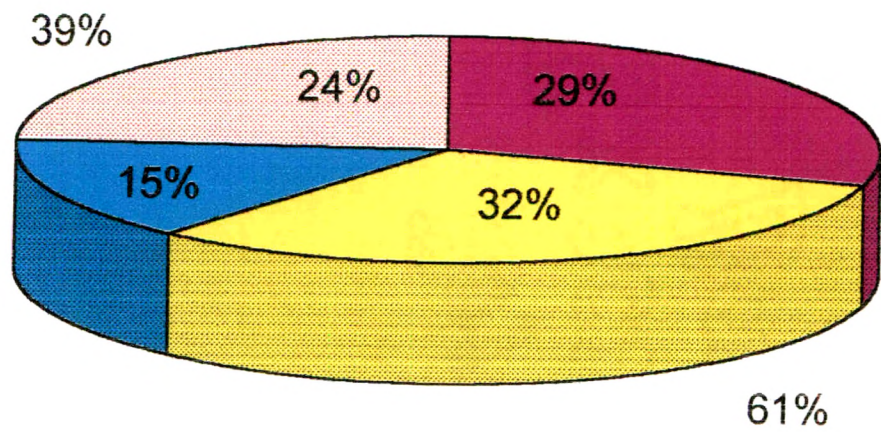


FIG. III-4. Distribution of Female & Male student teachers in sample.



- Urban Female student teachers
- Urban Male student teachers
- Rural Female student teachers
- Rural Male student teachers

FIG.III-5. Distribution of Urban & Rural student teachers in the sample.

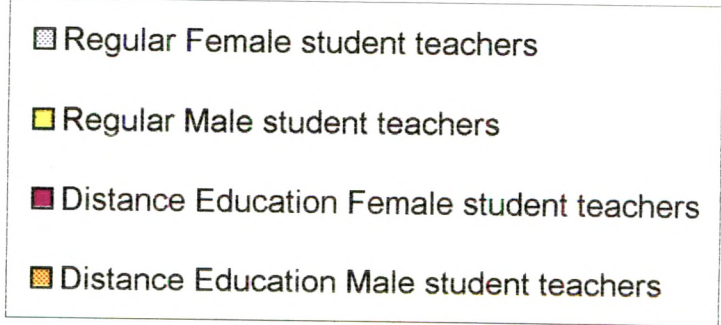
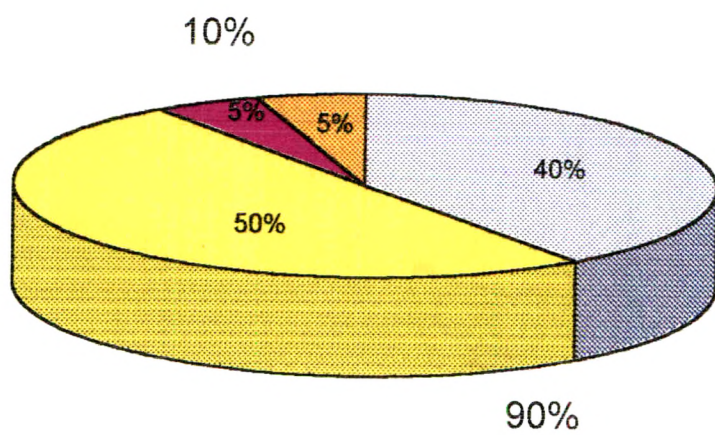


FIG. III-6. Distribution of Regular & Distance Education student teachers.

decision was to delete to items from the test and test was having 100 items only.

The retest was conducted after twenty days from the first test. The time required to complete test was 45 mints. for about 90 % students and 5 minutes extra time required for 10 % students. The collected test was evaluated as per previous evaluation method, marks, scores are recorded for individual students as per appendix- E.

3.9 Standardization-

A psychological test is essentially an objective and standardized measure of a sample of behaviour psychological tests are like tests in any other science give less perfect measurements because all things are related to the individuals behaviour. But every test must be standardized.

The word standardization was used while defining test. Standardization implies uniformity of procedure in administering and scoring the test. If the scores of different individuals are to be compared than the testing situations should be similar for all individuals. In order to secure uniformity of the test developer provides detail instruction for administering each newly developed test. In standardization the material used, time limits, oral instructions to subject, preliminary demonstration, ways of handing queries from subject and every other details of the testing situation are described.

Another important step in the standardization of a test is the establishment of norms. Without norms test scores can not

be interpreted. In any psychological test there is no criteria available on the basis of which one can say pass or fail. The evaluation of any individuals is done by comparing two score with the scores of other individuals. As its name implies a norm is the normal or average performance.

In test the standardization process other criteria of the good measuring test are also important and they are represented as follows.

3.9.1 Criteria of a good test.

Practical criteria.

1. Ease of scoring
2. Time
3. Cast
4. Face validity
5. Purpose
6. Meaningfulness of Test scores
7. Acceptability
8. Ease of Administration
9. Ease of interpretation. #11

Technical criteria.

1. Validity
2. Reliability
3. Objectivity
4. Discrimination
5. Standardization
6. Norms
7. Items

3.9.2 Practical Criteria of Good Test.

1. Ease of scoring- Scoring in the test must be easy when items have been objectively constructed, then scoring procedure also become objective. Separate scoring key and scoring space must be provided so that answer sheets can be scored easily. For the attitude scale scoring key provided. Which is given in the appendix- N.

In attitude scale, the responses are expressed in terms of five categories, i.e. Strong Agree (SA) Agree (A), Undecided (U), Disagree (D), and Strongly Disagree (SD)

2] Time: Every-body wants to complete the test in short time. They do not like lengthy test in which requires more time to completely fill up. So the time in the test must not be too short or too lengthy. The reliability and validity of the test depends on its length. Short test few items destroy their values but items in test must not be beyond 100. Hence by keeping the consideration of time in this scale 100 number of items were formed.

3] Cost: A good test should be economical in the point of money, time and effort for testing procedure. In this scale questionnaire were provided separately and answer sheet provided separately. The same test was used as a scale more than one time.

4] Face validity: Face validity refers not to what the test actually measures, but to what it appears superficially to measure.

5] Purpose: Purpose of the test must be clearly defined. In this scale purpose or objectives are mentioned in chapter- I.

6] Meaningfulness of test scores- A test maker may obtain several scores from a test, but only single score is much more reliable.

7] Acceptability- A good test is acceptable to all the persons and in all circumstances and situation.

8] Ease of administration- A test is simple to apply and have more complete directions and have simple objective scoring for administration of the test. There should not require extra observation.

9] Ease of interpretation- There must be an easy method for interpretation of score obtained in the test.

3.9.3 Technical criteria of Good Test-

1) Validity- Validity of a test is the degree that we know what a test measures . Validity tells us whether the test measures right things for our purpose. No test is 100 % perfect but if a test measures to a high degree things it purposes to measures, it is valid for this scale statements were valid by experts and also calculated validity index for each item, given in table IV-2

2) Reliability- Reliability is the consisting of persons scores on a series of measurement. A measurement procedure is reliable to the extent that repeated measurement gives consistent result for the individual. Score is remaining some when the measurement is repeated. For developing the scale Test- Retest method was applied to calculate reliability coefficient and it is given in table-IV-6

3) Objectivity- Objectivity of items and objectivity of scoring are observed under objectivity. Items should be simple so that student can able to interpret the item correctly. There should not be confusion between examiner and student for interpreting

the measuring of item. While construction the items word like perhaps, always, never were avoided.

Objectivity of scoring means the personal judgment of the examiner should not effect scores. For attitude scale separate score key was provided with manual.

4) Standardization- Standardization means uniformity of administration and scoring. If the scores of different individuals are to be compared than the testing situations should be similar for all individuals.

In standardization development of norms is also important. Psychological test there is no criteria available on the bases of which one can say pass or fail. The evaluation of any individual is done by comparing two scores with the scores of other individuals. The term Norms means normal or average performance. Norms for this scale was expressed in percentiles. For interpretation of raw scores specific range is given in manual at appendix - N.

5) Norms- Establishing Norms is another essential part of standardization. Norms are those scores, which are usually earned by representative subject. Norms is called as measure of relative position. Norms permits the tester to compare the subject with his prospective comparisons and competitors. Norms should always refer to defined and clearly prescribed population. The persons position relative to his group has to be fixed as definitely as possible. The percentile method used to

calculate the Norms. The Norms were calculated in the form of percentiles given in chapter-IV.

6) Items- Constructed items in the test must be simple student can understand its meaning properly. Test should not be very easy or very hard.

7) Discrimination- A test should be able to measure difference between poor and good students.

8) Adequacy- The adequacy of the test has been maintained by taking almost all the activities and abilities of student teachers regarding the syllabus of Educational Technology as B. Ed. level.

3.10 Validity-

Validity of a test means truthfulness. A test is valid, if it is telling the truth. Validity may be defined as the accuracy with which a test measures whatever it is supposed to measure. The test validity and test purpose is closely associated. A test is valid if it meets the purpose for which it was designed. Practically a test may be used for several purposes; it might be valid for one purpose but not valid for another. A test is valid if it measures that sample alone, but truthfully.

The validity of a test is determined by measuring the extent to which it matches with a given criterion. A test may have many validates. Validity coefficients of a test may vary from place to place, situation to situation and time to time. It is not a fixed thing. #12

In the word of Anastai. "The question of test validity concerns what the test measures and how well it does so " #13

According to L. J. Cronbach, "Validity is the extent to which a test measures what it purports to measures. #14

The validity of a test cannot be reported general terms. No test can be said to have high or low validity. No test is 100 % perfect. Therefore, it a test measures to a high degree things it purports to measure, it is valid #15

In this research work the researcher gave statement list to expert, internal and content validity has been proved.

The present Attitude scale will be important for every student teachers incoming for B. Ed. course and so that is considered that this scale is valid.

The face, logical content validity is given in chapter IV.

3.11 Reliability-

The reliability of a test refers to the consistency of scores obtained by the same individuals on different occasions or with different sets of equivalent items.

Reliability studies give information about the consistency of person's scores on a series of measurements. It means a measurement procedure is reliable to the extent, to which it provides constant results on repeated measurements. Consistency of results means that an individual obtains same score on repeated measurement.

Test reliability tells that to what extent individual differences of scores can be assigned to chance errors. It tells us the extent to which true differences of traits can be attributed to these individual differences more technically, test reliability indicates what proportion of total variance is error variance. #16

In the words of Anne Anastasi, 'Reliability refers to the consistency of scores obtained by the same individuals when reexamined with the same test on different occasions or with different sets of equivalent items or under other variable examining conditions'.

Garrett defined, 'the reliability of a test or of any instrument depends upon the consistency with which it gauges the ability to whom it is applied'. #17

The reliability can be measured by four methods test retest method, Alternate or parallel method, Split-half method, rational equivalence method.

The researcher was followed test retest method for reliability determination. The reliability was calculated by taking effect of climate, situations, emotional reactions, personal problems of the examinee into account while administering it. The test was given to student teachers twice within the interval of twenty days.

The reliability coefficient for split up the scale items in equal two parts. And each part was given to student teachers of Yashwantrao Chavan Maharashtra Open University, Nasik, at two different time. And reliability coefficient was calculated.

Test-retest method is the simplest method of determining agreement between two sets of scores. The test is given and repeated on the same group and the correlation computed between the first and second set of scores. If the test is repeated immediately, many subjects will recall their first answers and spend their time on new material, thus tending to increase their scores. #18 To overcome this the researcher gives second test after twenty days by given sufficient time interval between the first and second administration of a test to offset in part at least memory, practice and other carryover effects, the retest coefficient becomes a close estimate of the stability of the test scores. When the test is given and repeated the reliability coefficient is primarily a stability coefficient.

The coefficient of correlation was determined by Pearson's product moment method by using the following formula.#19

$$r = \frac{\sum X'Y' - C \times cy}{N \sigma x . \sigma y}$$

In which

- $\sum x'y'$ - Sum of the product of deviations
- N - Number of paired associates
- Cx - Correlation in the x series [test]
taken in class interval units.
- Cy - Correlation in the Y series [retest]
taken in class interval units.
- $\sigma'x$ - Standard deviation for x series [test]
or distribution.

- Standard deviation for Y series [retest]
distribution.

For calculation of reliability coefficient 'r' is given in appendix -
F to K.

The coefficient of correlation is the reliability coefficient of the
test and it is given below.

Table. III-1.

Reliability coefficients of five colleges of attitude scale:

Sr. No.	College	Reliability coefficient
1	Azad College of Education, Satara	0.94
2	College of Education, Karad	0.89
3	College of Education (B. Ed.) Patan	0.95
4	College of Education (B. Ed.) Phaltan	0.92
5	Y. C. M. Open University, Nasik	0.87
6	Y. C. M. Open University, Nasik.(50-50)	0.99

3.12 Practicability [Usability].

For the standardization usability is also important factor. If the test has all good characteristic of good test, but test is not used, then that test has no advantage. For the usability of test following things must be maintained.

1] Can be easily operated- For answering the question there must be easy method. For that there must be objective type of questions included and for answering these questions space must be provided so the test can be used anywhere at anytime.

In attitude test, first covering page instructions for solving the test mentioned, answer sheet separately provided with item no and space for answer.

2) Easy scoring method- There must be provision of easy scoring and for that scoring key must be provided. In present attitude scale separate manual is given and manual itself self explanatory about how to score the test.

3) Economically Economical- Test must be economical, in our scale questionary was reused at many times only answer sheet is required at the time of test and answer sheet is a single page, so it is a reliable cost for test.

4) Time- Time required for solving the test should not more. In attitude scale 45 mints required for solving the test.

5) Interpretation of scores- The interpretation of scores and calculation of Norms has been done properly. Interpretation of scores is explained in the manual which is given in appendix - N.

6) The present test can be used in B. Ed. college for measurement of attitude towards Education Technology. #20

3.13 Statistical formulas for calculation-

The means for each subgroup were calculated separately by formula.

$$m = \frac{fx}{N}$$

$$M = \frac{\sum fX_m}{N}$$

Where M - mean

f- frequency

X_m - midpoints of each class interval

N - Total frequency or no. of students.

Then from those two means the difference have been calculated.

#21

To determine 'σ' that is standard deviation by using formula.

$$\sigma = i \times \sqrt{\frac{\sum fd'^2}{N} - C^2}$$

σ - Standard deviation

i - Size of class interval

Σfd'² - frequency X sum of square of deviation from A. M.

C- correction in reference to class interval which is

$$C = \frac{fd'}{N}$$

N- Total frequency of group.

By getting standard deviation for each participant group, data was subjected to calculate

$$\sigma_D = \sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}$$

σ_D = standard error of the difference between uncorrelated means

σ_1 = the standard deviation of first sample.

σ_2 = the standard deviation of second sample.

N_1 = size of first sample.

N_2 = size of second sample.

then to determine critical ratio or 't' value the value of σ_D was

$$t = \frac{D}{\sigma_D}$$

used in the following formula.

t = critical value

σ_D = standard error of the difference between uncorrelated means.

D = Difference between two group means #22

3.14 Calculation of Norms :

A raw score of any test has no meaning. It gets meaning only by comparison with some reference group or groups. Therefore establishing Norms is another essential part of standardization. Norms are those scores which are usually earned by representative subject. Norms is also called as measure of relative position. Norms permit the tester to compare the subject with his prospective comparisons and competitors. Norms should always refer to defined and clearly prescribed population. Norms are extremely important in guidance and clinical work. The person's position relative to his group has to

be fixed as definitely as possible. If the scores of an individual are below the norms for a particular job he should be advised not to adopt that course. Norms are expressed in terms of mean, standard deviation and percentiles, standard scores etc. Norms are measures of achievement, which represent the typical performance of some designated group or groups. The most common method is to compare the individual with a reference group. The tester refers to a table in the manual to learn what score in some type of derived score, which is a permanent record of the individual's relative position. The most common types of derived score are percentile and standard scores.

The researcher used the percentile to calculate the norms. The norms were calculated in the form of percentiles given in the Chapter IV. And distributing them in to Stannine scale which is construction of standard Nine. The norms were calculated for significant value of 't' for their groups. The score list is given in appendix- E. The norms were calculated considering retest score of the students teachers. #23

The formula used to calculate percentile score was

$$P_p = L + \frac{(P_n - F)}{f_p} \times i$$

Pp= Percentage of the distribution wanted. e. g 10%, 30%etc

L= lower limit of class interval where the desired percentile lie.

P= The score showing desired percentile.

F= Cumulative frequency below the class interval where the percentile lie.

f = frequency within the class interval where the percentile lie.

N= Total number of candidates

i= Length of the class interval.#24

3.15 Manual and scoring key

The manual is the principal source of information about the technical quality of a test. The manual provides detailed directions, scoring procedures and research findings. The manual is also sometimes supplemented as technical handbook. #25

M.B.Buch (1978-83) summarized need for the better manual. It must be emphasized that a manual helps not only the users of that test but also the developers to organize his thinking. Codify his procedure and communicates his idea intentions to others. Hence in order to be useful the test manual should contain information. #26

Preparing a good manual is difficult summarization of research into a manual is very hard. Committees of national organization interested in measurement studied the problem of improving information about tests and prepared a lengthy set of technical Recommendations for Psychological Tests and Diagnostic Techniques. (1954). #27

Most of the manuals of the tests reported in survey of Research in Education are adequate and in some respects misleading. So it has been strongly suggested that all developers follow the standard sets by the American Psychological Association in the publication referred to earlier. For the present test manual the stress has been given of following points by researcher.

- 1) The test manual prepared by researcher describes development of test and specification followed in writing of items.
- 2) The manual gives clear and complete description of norms.
- 3) The year of publication and collection of norms data is given in the manual.
- 4) The norms are calculated for each group separately.
- 5) The manual giving information about the total procedure, administration, reliability, validity, norms etc. has been prepared which is enclosed in appendix -N.

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